AGRICULTURAL DEPARTMENT

The Kentucky Agricultural Experiment Station and its Work

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EDITOR'S NOTE—This is the third of a series of articles on The Kentucky Agricultural Experiment Station and its Work.

CONDITIONS NECESSARY FOR ITS GROWTH

MANY letters are received by the Kentucky Agricultural Experiment Station asking whether alfalfa can be grown successfully in Kentucky. Our answer invariably is that it can be grown with a satisfactory degree of success if certain conditions are met.

Alfalfa is grown in the United States in all latitudes and under practically all climatic conditions, so the conditions of growth are largely soil conditions. They are as follows:

1. **A well drained soil is required.** Alfalfa will not thrive on a soil which has a subsoil that does

Limed Alfalfa, Rate Four Tons per Acre, Kentucky Experiment Station, 1913 Crop. Results given in second table.

not let water out readily. If water should stand nearer than three feet of the surface, even in wet weather, for more than two or three days at a time, the soil is too wet. If at less than a depth of two or three feet the subsoil should be whitish or grayish, it is an indication of poor drainage and sowing alfalfa on such soil would be risky.

2. **A fertile soil is required.** Alfalfa requires large amounts of plant food, and it is useless to sow it on thin soils. Alfalfa has the power, if inoculated, to obtain part of its nitrogen from the air, but can not make large growth if limited by the mineral elements of plant food. Practically all of the soils of the State, outside of the Blue Grass region, are deficient in phosphorous, and on such soils some form of phosphate should be used rather freely. Bone meal, acid phosphate, or raw ground phosphate rock may be used. They should be applied broadcast and disked in before plowing. In case the last named material is used, the soil should be especially well supplied with organic matter, or as we sometimes say, humus. At least a fair supply of humus is necessary for successful growth on any type of Kentucky soils.

3. **Lime or limestone is required.** It has been

Alfalfa in Kentucky

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shown repeatedly that alfalfa requires a liberal supply of lime or limestone. If the soil does not naturally contain limestone, it is necessary to supply either burnt lime or ground limestone. The Kentucky Station recommends an application of two tons of burnt lime or four tons of ground limestone per acre. The material should be applied on the plowed ground and disked in.

The following tables show some results obtained on the Kentucky Station Farm, which is typical central Kentucky Blue Grass soil of limestone origin and overlying limestone.

On a field sown in August, 1910, part of which was limed, the following yields were obtained. The figures are yields per acre.

	Limed	Unlimed	Gain
First Cutting, 1911.....	3,640 lbs.	2,080 lbs.	1,560 lbs.
First Cutting, 1912.....	4,760 "	3,900 "	860 "
Second Cutting, 1912.....	3,740 "	3,280 "	460 "
Total for 3 Cuttings,.....	12,140 lbs.	9,260 lbs.	2,889 lbs.

The severe drouth of 1911 prevented subsequent cuttings that year.

On another field sown in August, 1912, experiments were made to determine the effect of different amounts of limestone. Sulfate of potash was also used in one experiment. Two cuttings were made, the severe drouth of this year preventing sufficient growth for later cuttings. (Alfalfa can not withstand severe drouth the first year, on account of its not having rooted deeply.) The following table shows the results obtained:

Amount of Limestone per acre	First cutting	Second cutting	Total	Increase over untreated soil
None	600	771	1,371	.. ..
6 tons	2,228	1,592	3,820	2,449
4 tons	2,450	2,010	4,460	3,089
2 tons	1,943	1,607	3,550	2,179
2 tons + 300 lbs. sulphate of potash.....	2,418	1,530	3,948	2,577

It will be seen that limestone in every case gave a large increase. On this particular field the limestone cost $2.00 per ton applied to the soil. In case of the largest application, it was paid for by the increase in the first two cuttings. For the first year, however, the most profitable increase was from four tons per acre. We do not have sufficient data to show what is the most profitable amount to apply to last through the period for which the ground is occupied by the crop, which is usually four to six years. The use of potash is not profitable on this type of soil as indicated by the results of the first year. Perhaps the only soils in the State that do not need the application of limestone for the growth of alfalfa are the limestone hills of the northern part of the State.

4. **Inoculation is necessary.** If the soil does not already contain the nodule forming bacteria, they should be introduced when seeding alfalfa. This may be done by using laboratory cultures which are applied to the seed, or by using soil from an alfalfa or sweet clover field known to be infected with the bacteria. Laboratory cultures may be purchased from commercial houses and they are sometimes sent out free of charge by the U. S. Bureau of Plant Industry, Washington, D. C. Cultures of this organism may also be obtained from the Kentucky Agricultural Experiment Station, free of charge, upon sufficient notice. In case soil is used, not less than

Unlimed Alfalfa, Kentucky Experiment Station, 1913 Crop. Results given in second table.

200 pounds per acres should be scattered broadcast and immediately harrowed in.

In making examination of roots for nodules, they should not be pulled up but should be carefully lifted out with a spade. The soil should be carefully removed, preferably by soaking it off in water.

5. **The ground must be free from weeds and grass.** The presence of weeds and wild grasses, or even blue grass, is detrimental to the growth of alfalfa. With all the other conditions favorable the presence of weeds and wild grasses will mean a failure.

PREPARATION OF SEED BED AND SEEDING

It is best to seed about August 15, as spring seeding generally means a struggle with crab grass and foxtail throughout the season, without much return in hay.

The seed bed should be prepared for some time before seeding and should be cultivated frequently to kill weeds and conserve moisture. The ground should not be stirred deeply immediately before seeding as this will throw up a new lot of weed seeds which will germinate along with the alfalfa. The ground may be broken in the